

WHAT IS CLAIMED IS:

1. An ultrasonically visible solid device for inserting into a non-gas target medium, the device comprising an echogenic surface having structures entrapping gas causing the device to be ultrasonically visible, wherein the gas-entrapping structures are formed from open structures covered with a flexible overcoat that does not significantly reduce the compressibility of the gas trapped in the structures.
2. The device of claim 1, wherein the overcoat improves one or more properties of the device selected from echogenic coating durability, lubricity, surface smoothness, protection of the echogenic layer from deleterious effects of exposure to body fluids.
3. The device of claim 1, wherein the structures are selected from the group consisting of pores, channels, cavities, pockets, and combinations thereof, covered by the overcoat.
4. The device of claim 1, wherein the overcoat incorporates one or more pharmaceutical agents.
5. The device of claim 1, wherein the overcoat layer reduces wettability so as to promote and/or prolong the entrapment of gas when the device is in the target medium.
6. A device according to claim 1 wherein the overcoat layer has a thickness below about 2 microns.
7. A device according to claim 1 wherein the overcoat layer has a thickness of between about 0.1 and about 1 micron.
8. A device according to claim 1 wherein the overcoat layer has a flexural modulus greater than about 500 psi.

9. A device according to claim 1 wherein the overcoat layer has an elongation at break greater than about 100 percent.

10. A device according to claim 1 wherein the overcoat layer results in a decrease in the compressibility of less than about 20 percent of the entrapped gas bubbles.

11. A device according to claim 1 wherein the overcoat layer has a water permeability of less than about 10^{-10} [(cm³)(cm)]/(cm²)(s)(cm Hg)].

12. A device according to claim 1 wherein the device is a stent, central venous catheter, peripherally inserted catheter, graft, shunt, percutaneous transcatheter arterial catheter, pacemaker, dialysis device, joint replacement, long term urinary device, tissue bonding urinary device, penile prosthesis, vascular catheter port, peripherally insertable central venous catheter, long term tunneled central venous catheter, peripheral venous catheter, short term central venous catheter, arterial catheter, PCTA or PTA catheter, and pulmonary artery Swan-Ganz catheter, guidewire, a surgical instrument, endoscopy equipment, an angioplasty balloon, a wound drain, a gastroenteric tube, laparoscopy equipment, a pellet, and an implant, and combinations thereof.

13. The device of claim 1, wherein the overcoat comprises one or more of polyethylene, ethylene/vinyl acetate copolymers, epoxy resins, polydimethylsiloxane, polytetrafluoroethylene, polyvinylbutyral, polyvinylidenechloride, polyurethanes, polyimides, rubbers, acrylate polymers/copolymers, butadiene, styrene butadiene, and styrene butadiene/styrene copolymers.

14. The device of claim 1, comprising an active agent selected from one or more of anti-thrombogenic agents, anti-inflammatory agents, antineoplastic agents, anti-proliferative agents, cytostatic agents, cytotoxic agents, antimicrobial agents, anti-restenotic agents, anti-platelet agents, anti-coagulant agents, anti-fibrin and fibrinolytic agents, prostacyclins (and analogues), glycoprotein IIb/IIIa agents, thromboxane inhibitors, anti-thrombin agents, anti-mitotic, antiangiogenic and angiostatic agents, ACE

inhibitors, growth factor antagonists, antioxidants, vitamins, calcium channel blockers, fish oil (omega 3-fatty acid), phosphodiesterase inhibitors, nitric acid donor, Somatostatin analogues, immunosuppressives and antiinflammatory agents, antimicrobials, radionuclides including alpha, beta and gamma emitting isotopes, COX-2 inhibitors, endothelial promoters, kinase inhibitors, epidermal growth factor kinase inhibitors, tyrosine kinase inhibitors, MAP kinase inhibitors, and protein transferase inhibitors.

15. A device according to claim 1 comprising an active agent selected from one or more of plasmin, streptokinase, single chain urokinase, urokinase, t-PA (tissue type plasminogen activator), aminocaproic acid, aspirin, monoclonal antibodies, peptides, ReoPro, Cilastagel, eptifibatide, tirofiban, ticlopidine, Vapiprost, dipyridamole, forskolin, angiopeptin, argatroban, dextan, heparin, LMW heparin, Enoxaparin, Dalteparin, hirudin, recombinant hirudin, anti-thrombin, synthetic antithrombins, thrombin inhibitors, Warfarin, other coumarins, vincristine, vinblastine, paclitaxel and its analogues, methotrexate, cisplatin, fluorouracil, rapamycin, azathioprine, cyclophosphamide, mycophenolic acid, corticosteroids, colchicine, nitroprusside, paclitaxel, angiostatin and endostatin; genetic materials, oligonucleotides, Cilazapril, Lisinopril, Captopril, VEGF, FGF, Probucol, Tocopherol, nifedipine, dipyridamole, Molsidomine, angiopeptin, prednisolone, glucocorticoid, dexamethasone, rifamycin, Re-188, Re-186, I-125, Y-90 celecoxib, Vioxx, dipyridamole, and theophylline.

16. A method of making the device of claim 1, comprising preparing a surface having open gas-trapping structures, and over-coating with a thin, flexible film enclosing the bubbles in the surface structures beneath the coating.

17. A method of visualizing a medical device according to claim 1 in an ambient medium, comprising:

inserting the device into a tissue,

leaving the device in the tissue for a prolonged period,

then directing an ultrasound beam at the tissue, and observing the device in the tissue.

18. A method for increasing the echogenicity of an object when subjected to ultrasound in an ambient material, the method comprising the steps of:

providing a coating liquid comprising a film-forming constituent;

applying the coating liquid to the object;

allowing the film-forming constituent to form a film comprising a solid matrix;

and

providing the film with an echogenic structure presenting echogenicity-increasing gas/non-gas interfaces,

wherein the echogenic structure comprises a top coating over gas-trapping spaces, and wherein providing the film with an echogenic structure comprises including in the coating liquid (a) gas bubbles, and/or (b) a reactive material that generates gas upon reaction with a reactor and further contacting the reactive material with the reactor to produce gas.

19. A device comprising a compressible surface and means for trapping gas at the surface, the gas trapping means enhancing echogenicity of the device when placed in a non-gas medium, the gas-trapping means comprising means for retaining gas during a prolonged period in the target medium.